Vestnik zoologii, **41**(4): 305—313, 2007

UDC 595.34.(575.1)

THE GENUS *SCHIZOPERA* (COPEPODA, HARPACTICOIDA) IN UZBEKISTAN (CENTRAL ASIA)

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Accepted 21 November 2006

The Genus *Schizopera* (Copepoda, Harpacticoida) in Uzbekistan (Central Asia). Mirabdullayev I. M., Ginatullina E. N. — Species of the genus *Schizopera* G. O. Sars, 1905 occurring in Uzbekistan are reviewed. *Schizopera spinulosa* Mirabdullayev et Ginatullina, sp. n. from Aydarkul Lake and *Schizopera setulosa* Mirabdullayev et Ginatullina, sp. n. from Ustyurt Plateau are described. In addition, *S. jugurtha* (Blanchard et Richard, 1891), *S. reducta* Borutsky, 1971 and *S. aralensis* Borutsky, 1971 have been previously recorded from Uzbekistan.

Key words: Copepoda, Harpacticoida, *Schizopera*, new species, Uzbekistan.

Род *Schizopera* (Copepoda, Harpacticoida) в Узбекистане (Центральная Азия). Мирабдуллаев И. М., Гинатуллина Е. Н. — Обзор встречающихся в Узбекистане видов рода *Schizopera* G. O. Sars, 1905. Описаны *Schizopera spinulosa* Mirabdullayev et Ginatullina, sp. n. из оз. Айдаркуль и *Schizopera setulosa* Mirabdullayev et Ginatullina, sp. n. с плато Устюрт. Кроме того, из Узбекистана отмечены *S. jugurtha* (Blanchard et Richard, 1891), *S. reducta* Borutsky, 1971 и *S. aralensis* Borutsky, 1971.

Ключевые слова: Copepoda, Harpacticoida, *Schizopera*, новые виды, Узбекистан.

Introduction

The genus *Schizopera* G. O. Sars, 1905 is poorly known in Central Asia. *S. paradoxa* (Daday, 1904) was described from groundwaters in the vicinity of the Issyk-Kul Lake (Kirgizia) (Daday, 1904) and later recorded from eastern Turkmenistan (Birstein, Ljovuschkin, 1965) and again from the vicinity of the Issyk-Kul Lake (Borutsky, 1972, 1978). *S. pseudojugurta* Borutsky, 1972 was also described from groundwaters in the vicinity of Issyk-Kul. E. V. Borutsky (1971) reported *S. jugurtha* (Blanchard et Richard, 1891) from the Aral Sea (Uzbekistan) and described two new species, *S. aralensis* and *S. reducta*, from the lake.

The study of planktonic samples collected in Uzbekistan revealed three species, including two species new to science.

Material and methods

More than 600 plankton samples collected in 1960—2004 from lakes, reservoirs, ponds, rice fields, and pools from all regions of Uzbekistan were studied. Samples were fixed in 4% formaldehyde. Dissected animals were mounted in glycerin and studied with a Leica microscope. All drawings were made using a drawing tube.

Schizopera setulosa Mirabdullayev et Ginatullina, **sp. n.** (fig. 1—23)

Material examined. 12 ♀, 6 ♂, stream on the eastern slope of the Ustyurt Plateau near Lake Sudochie, Karakalpakstan, July 2000, salinity: 6 ppt.; 2 ♀, ♂, Lake Sudochie (Karateren), Karakalpakstan, July 1999; ♀, 2 ♂, July 2000, salinity: 4–6 ppt.

Type material. Holotype ♀ (mounted on a slide, Cop. N 005–006), allotype ♂ (mounted on a slide, Cop. N 007), paratypes 5 ♀ in a tube and 3 dissected ♀ (mounted on slides) are deposited in the Institute of Zoology (Tashkent). Type locality: stream on the eastern slope of the Ustyurt Plateau near Lake Sudochie.

Female. Body length 520—570 mkm. Rostrum elongated, basally with suture. Dorsal caudal margin of cephalothorax and following 4 somites smooth. Dorsal caudal

margin of following somites finely spinulose (fig. 1). Genital double-somite laterally with a trace of subdivision.

Genital field: see figure 2.

Caudal dorsal margin of penultimate somite slightly bulging, thus forming a pseudoperculum. Anal operculum with fine spinules.

Caudal rami about twice as long as broad (fig. 3—4). On outer corner a strong spine arises subdistally. Close to this spine a slender seta inserts. Main terminal setae

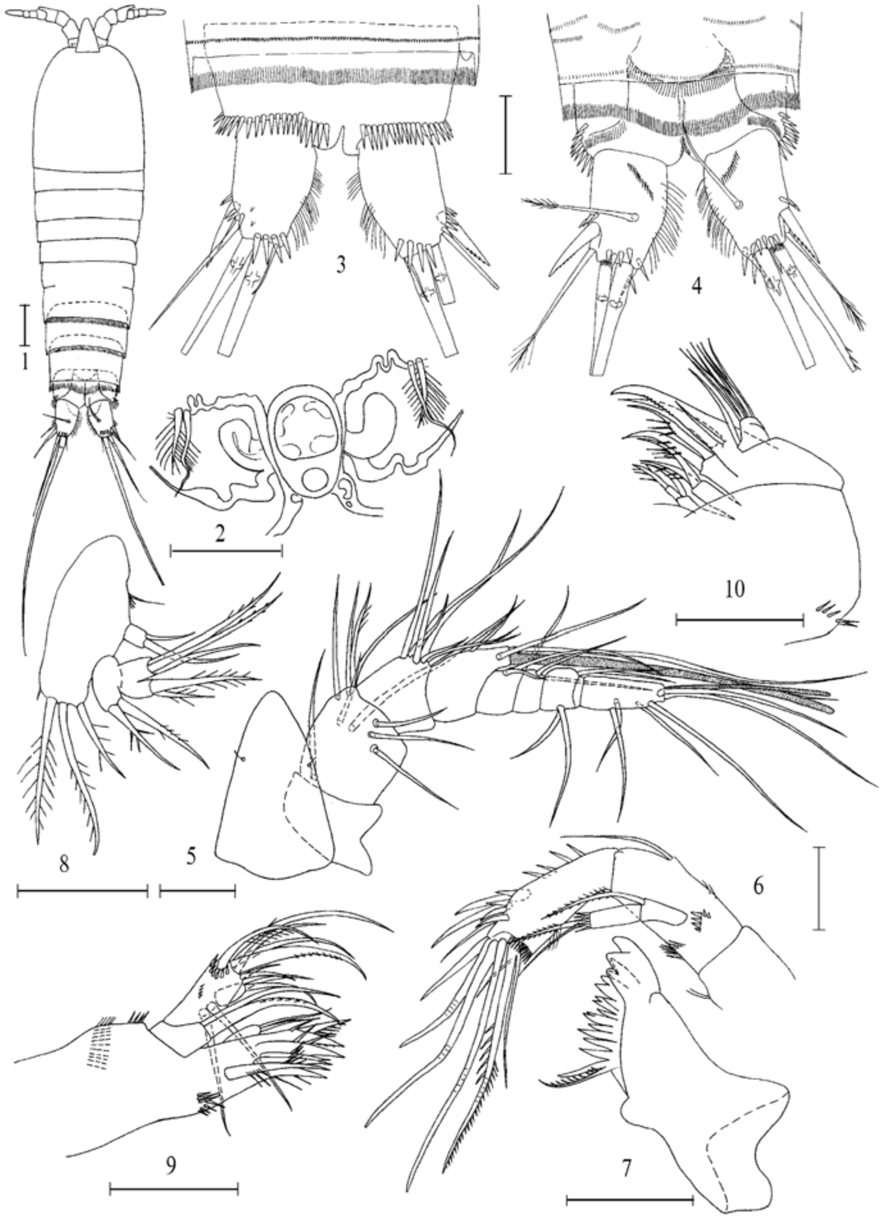


Fig. 1—10. *S. setulosa*, ♀: 1 — habitus; 2 — genital field; 3 — furca, ventral side; 4 — furca, dorsal side; 5 — antennula; 6 — antenna; 7 — mandible; 8 — mandibular palp; 9 — maxillula; 10 — maxilla. Scale bar: 1 — 50 mkm; 2—10 — 25 mkm.

Рис. 1—10. *S. setulosa*, ♀: 1 — общий вид; 2 — генитальное поле; 3 — фурка, брюшная сторона; 4 — фурка, спинная сторона; 5 — антеннула; 6 — антенна; 7 — мандибула; 8 — щупик мандибулы; 9 — мкасиллула; 10 — максилла. Масштабная линейка: 1 — 50 мкм; 2—10 — 25 мкм.

slightly swollen basally. Inner distal corner of caudal rami with a short seta. Slightly distal from middle of the caudal rami, a plumose seta is located on dorsal side. Inner margin of caudal rami with setules, distal edge with spinules ventrally and dorsally.

Antennule (fig. 5): 8-segmented. Second segment longest. Fourth and last segment each with aesthetasc.

Antenna (fig. 6): Basis and endopodite weakly separated. Basis with several spinules. First endopodite segment with 1 seta. Second endopodite segment with a row of spinules, 2 spines and 1 slender seta on anterior margin. Distal edge furnished with a row of spinules, 1 slender seta, 1 spine and 4 geniculate setae, the posteriormost of which is fused basally with another slender seta. Exopodite 2-segmented, both segments about the same length. Proximal segment distally with 1 plumose seta, terminal segment with a strong appendage, 1 slender seta and some spinules.

Mandible (fig. 7, 8): Chewing edge of precoxa (coxa) with several pointed teeth and a unilaterally armed seta. Coxa-basis (basis) with 3 slender plumose setae. Endopodite 1-segmented, bearing 2 setae laterally and 2+3 setae distally. Exopodite consisting of a small segment, which has 1 long and 1 rather short seta.

Maxillula: as in figure 9.

Maxilla: as in figure 10, with 3 endites.

Maxilliped (fig. 11): Basis (syncoxa) with several rows of spinules and 2 plumose setae. Proximalmost endopodite segment (basis) with 2 rows of spinules and 2 slender setae on inner margin. Distal endopodite segment (endopodite) equipped with 1 claw and 2 slender setae.

Leg 1 (fig. 12): Basis with rows of spinules and a spine on inner and outer margin. Exopodite 3-segmented, all segments about the same length. Distal segment with

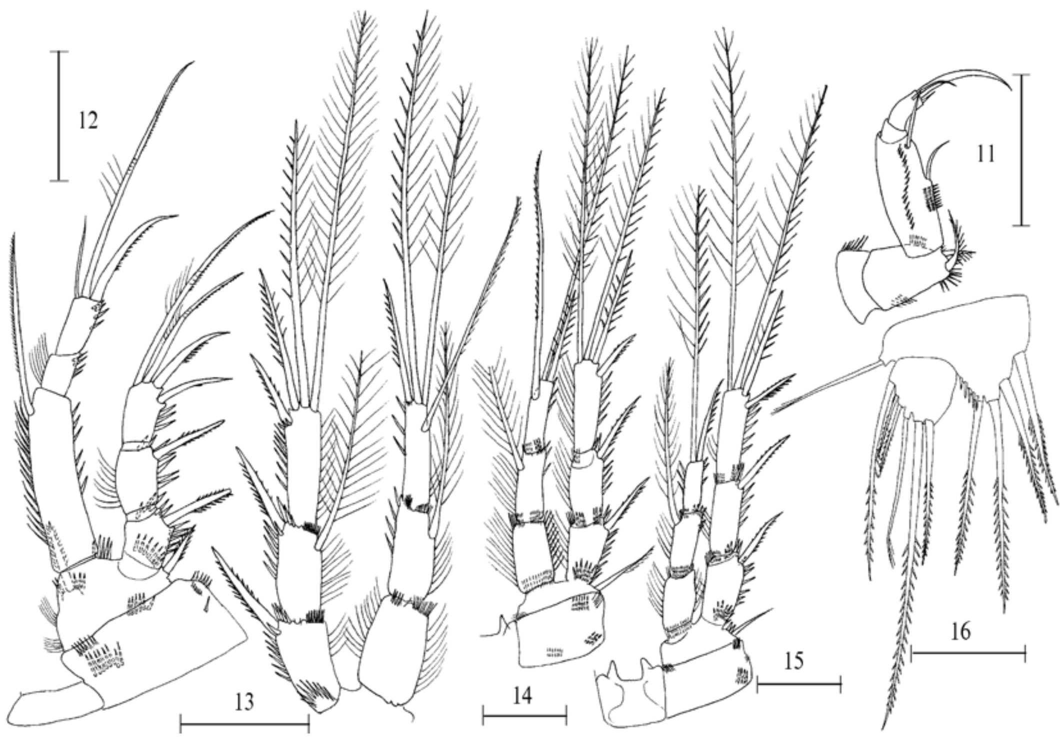


Fig. 11—16. *S. setulosa*, ♀: 11 — maxilliped; 12 — leg 1; 13 — leg 2; 14 — leg 3; 15 — leg 4; 16 — leg 5. Scale bar 25 mkm.

Рис. 11—16. *S — setulosa*, ♀: 11 — максиллипеда; 12 — нога 1; 13 — нога 2; 14 — нога 3; 15 — нога 4; 16 — нога 5. Масштабная линейка 25 мкм.

4 appendages. Endopodite 3-segmented, its first segment about as long as exopodite, inner margin subapically with a strong seta. Distalmost segment with 1 short slender, 1 geniculate and 1 strong claw-like seta.

Leg 2—Leg 4 (fig. 13—15): Coxa with a few rows of spinules. Intercoxal plate protruded into 2 spiniform processes. 3-segmented exopodites of leg 2 and leg 3 about the same length as endopodite, exopodite of leg 4 distinctly longer.

Seta and spine formula are given in table 1.

Leg 5 (fig. 16): Basoendopodite with slender outer seta, inner part equipped with 4 strong setae. Exopodite as long as wide, furnished with 6 setae of different lengths.

Male. Furcal rami with setules on inner side (fig. 17, 18). Male differs from the female in the following respects: body length 390—430 mkm; antennule haplocer (fig. 19); endopodite leg 2 with sexual dimorphism typical for the genus *Schizopera* (fig. 20); inner part of basis leg 1 modified (fig. 21); distal segment of exopodite leg 3 with an inner spine, typical for the genus (fig. 22); both legs 5 fused. Inner part of basoendopodite with 2 appendages. Exopodite with 5 appendages (fig. 23).

Table 1. Appendage formula of swimming legs
Таблица 1. Формулы плавательных ног

Leg	*S. spinulosa*		*S. setulosa*		*S. aralensis*	
	exopodite	endopodite	exopodite	endopodite	exopodite	endopodite
Leg 1	0.0.4	1.0.3	0.0.4	1.0.3	0.0.4	1.0.3
Leg 2	0.1.4	0.1.4	0.1.4	0.1.4	0.1.4	0.1.4
Leg 3	0.1.4	1.1.4	0.0.4	0.1.3	0.1.4	0.1.4
Leg 4	0.1.4	1.1.3	0.0.4	0.1.2	0.1.4	0.1.3

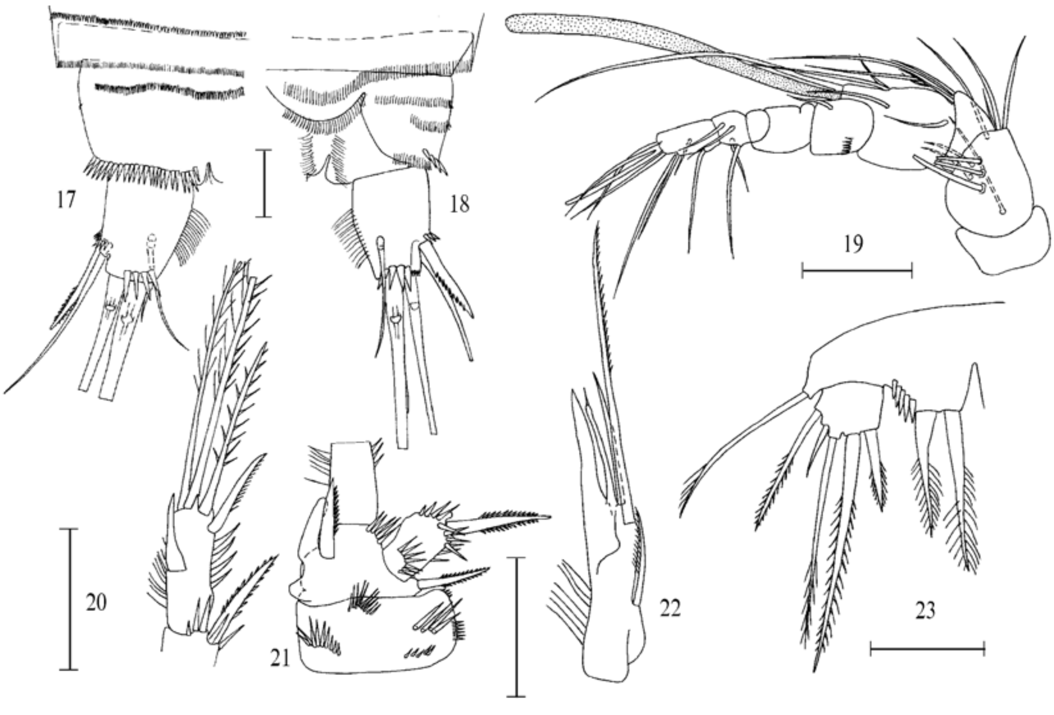


Fig. 17—23. *S. setulosa*, ♂: 17 — furca, ventral side; 18 — furca, dorsal side; 19 — antennulф; 20 — proximal part of leg 1; 21 — distal segment of endopodite of leg 2; 22 — distal segment of exopodite of leg 3; 23 — leg 5. Scale bar 25 mkm.

Рис. 17—23. *S. setulosa*, ♂: 17 — фурка, брюшная сторона; 18 — фурка, спинная сторона; 19 — антеннула; 20 — проксимальная часть ноги 1; 21 — дистальный сегмент эндоподита ноги 2; 22 — дисталдьный сегмент экзоподита ноги 3; 23 — нога 5. Масштабная линейка 25 мкм.

Differential diagnosis. *S. setulosa* differs from most congeners by the setal formula of its swimming legs. The only known species having the same setal formula is *S. cicolanii* Galassi et Pesce, 1988. *S. setulosa* differs from *S. cicolanii* by the presence of setules, not long spinules on inner side of furcal rami; presence of inner furcal apical seta (absent in *S. cicolanii*); significantly longer outermost apical furcal plumose seta; absence of circular spinule pattern on ventral surface of abdominal somite; anal operculum bearing spinules (smooth in *S. cicolanii*); relative length of P5 setae (Galassi, Pesce, 1988).

Schizopera spinulosa Mirabdullayev et Ginatullina, **sp. n.** (fig. 24—43)

Material examined. 2 ♀, 2 ♂, Lake Aydarkul, Jizzak Province, Uzbekistan, June 1995; 2 ♀, 3 ♂, May 2004, salinity: 7—8 ppt.; ♀, Lake Dengizkul, Bukhara Province, Uzbekistan, June 1993, salinity: 12 ppt.

Type material. Holotype ♀ (mounted on a slide, Cop. N 011—013), allotype ♂ (mounted on a slide, Cop. N 014), paratypes 2 ♀ in a tube and 2 dissected ♀ (mounted on slides) are deposited in the Institute of Zoology (Tashkent). Type locality: Lake Aydarkul.

Female. Body length 500—580 mkm. Rostrum elongated, basally with suture. Dorsal caudal margin of cephalothorax and following 4 somites smooth. Dorsal caudal margin of following somites finely spinulose. Genital double-somite laterally with a trace of subdivision.

Caudal dorsal margin of penultimate somite slightly bulging, thus forming a pseudoperculum. Anal operculum with fine spinules (fig. 25).

Caudal rami about twice as long as broad (fig. 24, 25). On outer corner a strong spine arises subdistally. Close to this spine a slender seta inserts. Main terminal setae slightly swollen basally. Inner distal corner of caudal rami with a short seta. Slightly distal from middle of the caudal rami, a plumose seta is located on dorsal side. Inner margin of caudal rami with spinules, distal edge with tiny spinules ventrally and dorsally.

Genital field: see figure 26.

Antennule (fig. 27): 8-segmented. Second segment longest. Fourth and last segment each with aesthetasc.

Antenna (fig. 28): Basis and endopodite are separated. Basis without ornamentation. First endopodite segment with 1 seta and several rows of spinules. Second endopodite segment with a row of spinules, 2 spines and 2 slender setae on anterior margin. Distal edge furnished with a row of spinules, 1 slender seta, 1 spine, and 4 geniculate setae posteriormost of which is fused basally with another slender seta. Exopodite 2-segmented, distal segment longer. Proximal segment distally with 1 plumose seta, terminal segment with 1 slender seta and several spinules.

Mandible (fig. 29): Chewing edge of precoxa (coxa) with several pointed teeth. Coxa-basis (basis) with 3 slender setae. Endopodite 2-segmented, bearing 2 setae on first segment laterally and 3 setae on second segment. Exopodite consisting of a small segment, which has 1 seta.

Maxilla: as in figure 30.

Maxilliped (fig. 31): Basis (syncoxa) with several rows of spinules and 2 stout plumose setae. Proximal endopodite segment (basis) with 2 rows of spinules and 2 slender setae on inner margin. Distal endopodite segment (endopodite) equipped with 1 claw and 3 slender setae.

Leg 1 (fig. 32): Basis with rows of spinules and a spine on inner and outer margin. Exopodite 3-segmented, all segments about the same length. Distal segment with 4 appendages. Endopodite 3-segmented, its first segment about as long as exopodite, inner margin subapically with a strong seta. Distalmost segment with 1 short slender, 1 geniculate and 1 strong claw-like seta.

Leg 2—Leg 4 (fig. 33—35): Coxa with a few rows of spinules. Intercoxal plate protruded into 2 spiniform processes. 3-segmented exopodites of leg 2 and leg 3 about the same length as endopodites, exopodite of leg 4 distinctly longer.

Seta and spine formula are given in table 1.

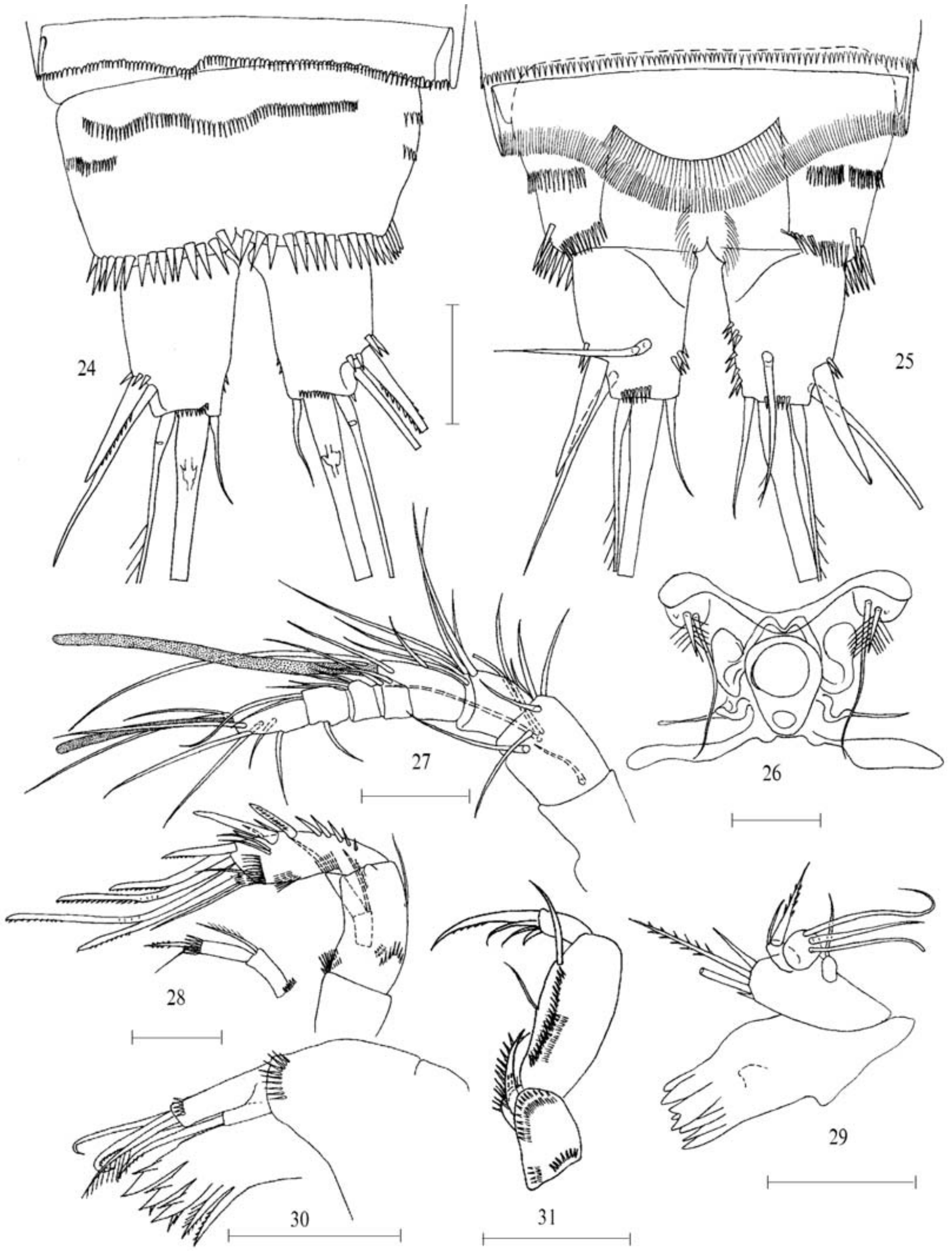


Fig. 24—31. *S. spinulosa*, ♀: 24 — furca, ventral side; 25 — furca, dorsal side; 26 — genital field; 27 — antennula; 28 — antenna; 29 — mandible; 30 — maxillula; 31 — maxilliped. Scale bar 25 mkm.

Рис. 24—31. *S. spinulosa*, ♀: 24 — фурка, брюшная сторона; 25 — фурка, спинная сторона; 26 — генитальное поле; 27 — антеннула; 28 — антенна; 29 — мандибула; 30 — максиллула; 31 — максиллипед. Масштабная линейка 25 мкм.

Leg 5 (fig. 36): Basendopodite with a slender outer seta, inner part equipped with 4 strong setae. Exopodite as long as wide, furnished with 6 setae of different lengths.

Male. Furcal rami with setules on inner side (fig. 37—39). Male differs from female in the following respects: body length 400—430 mkm; antennule haplocer; inner

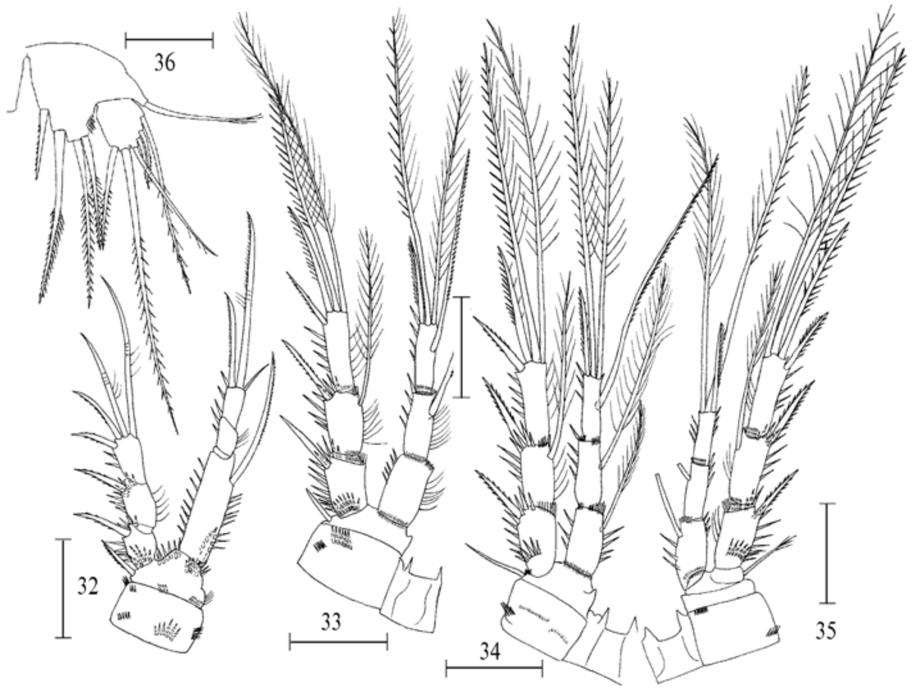


Fig. 32—36. *S. spinulosa*, ♀: 32 — leg 1; 33 — leg 2; 34 — leg 3; 35 — leg 4; 36 — leg 5. Scale bar 25 mkm.

Рис. 32—36. *S. spinulosa*, ♀: 32 — нога 1; 33 — нога 2; 34 — нога 3; 35 — нога 4; 36 — нога 5. Масштабная линейка 25 мкм.

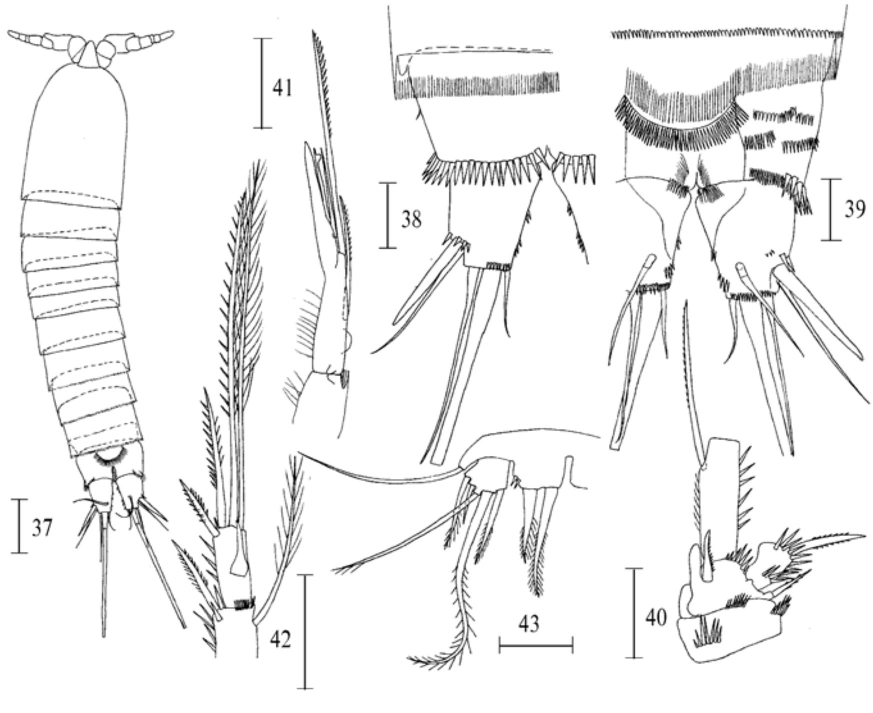


Fig. 37—43. *S. spinulosa*, ♂: 37 — habitus; 38 — furca, ventral side; 39 — furca, dorsal side; 40 — proximal part of leg 1; 41 — distal segment of endopodite of leg 2; 42 — distal segment of exopodite of leg 3; 43 — leg 5. Scale bar: 37 — 50 mkm, 38—43 — 25 mkm.

Рис. 37—43. *S. spinulosa*, ♂: 37 — общий вид; 38 — фурка, брюшная сторона; 39 — фурка, спинная сторона; 40 — проксимальная часть ноги 1; 41 — дистальный сегмент эндоподита ноги 2; 42 — дистальный сегмент экзоподита ноги 3; 43 — нога 5. Масштабная линейка: 37 — 50 мкм, 38—43 — 25 мкм.

part of basis leg 1 modified (fig. 40); endopodite leg 2 with sexual dimorphism typical for the genus *Schizopera* (fig. 41); distal segment of exopodite leg 3 with an inner spine, typical for the taxon (fig. 42); both legs 5 fused. Inner part of basendopodite with 2 appendages. Exopodite with 5 appendages (fig. 43).

Differential diagnosis. *Schizopera spinulosa* most close to *S. chaetosa* Petkovski, 1954, known from the Black Sea. Both species have spinules on inner margin of caudal rami and the same swimming leg formula. *S. spinulosa* differs from *S. chaetosa* by shape of P5 and ornamentation of caudal rami.

Schizopera aralensis Borutsky, 1971 (fig. 44—47)

Material examined: 3 ♀, ♂, L. Akushpa, Karakalpakstan, April 2000, salinity: 24 ppt.; 3 ♀, ♂, L. Akpetki, Karakalpakstan, July 1990, salinity: 14 ppt.; 5 ♀, 4 ♂, L. Ashikul, Karakalpakstan, July 1993, salinity: 12 ppt.; 3 ♀, 3 ♂, L. Ayazkala, Karakalpakstan, July 1990, salinity: 12 ppt.; 3 ♀, L. Aybugir, Karakalpakstan, July 1990, salinity: 10 ppt.; 4 ♀, 2 ♂, L. Saykul, Karakalpakstan, June 2003, salinity: 8 ppt.; ♀, 2 ♂, L. Sudochje (Karateren), Karakalpakstan, July 2003, salinity: 8 ppt.; 2 ♀, 2 ♂, L. Dengizkul, Bukhara Province, June 1993, salinity: 12 ppt.; ♀, ♂, L. Aydarkul, Jizzak Province, May 2001 and 2 ♀, 2 ♂, May 2004, salinity: 8 ppt.

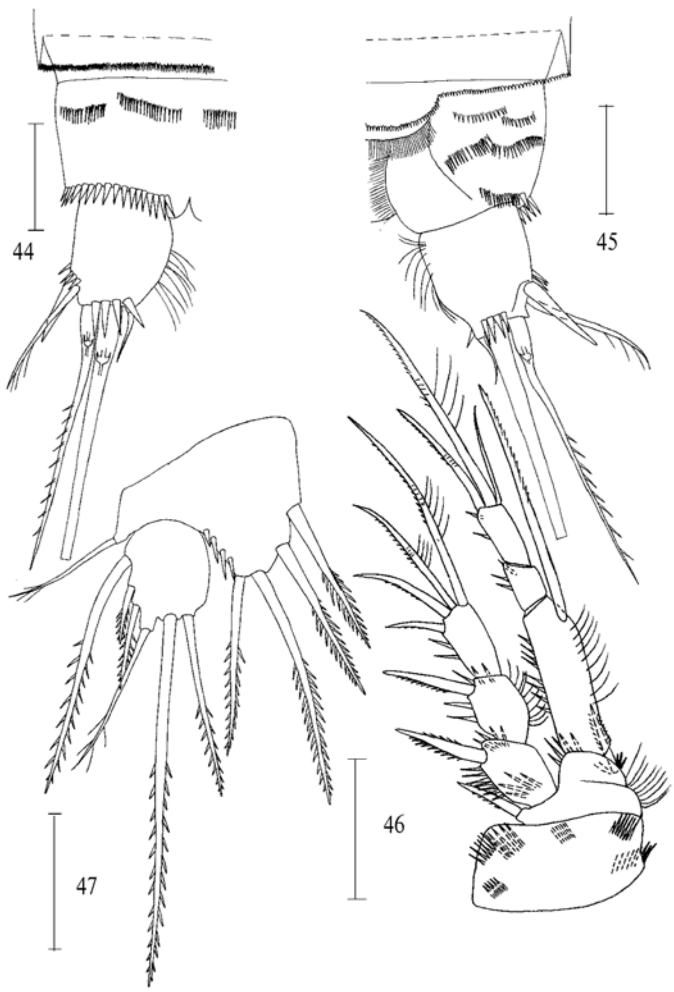


Fig. 44—47. *S. aralensis*, ♀: 44 — furca, ventral side; 45 — furca, dorsal side; 46 — leg 1; 47 — leg 5. Scale bar 25 mkm.

Рис. 44—47. *S. aralensis*, ♀: 44 — фурка, брюшная сторона; 45 — фурка, спинная сторона; 46 — нога 1; 47 — нога 5. Масштабная линейка 25 мкм.

This species is very close to or conspecific with *Schizopera neglecta* Akatova, 1935 known from the Caspian and Black seas (Akatova, 1935; Monchenko, 1967). The only clear difference of *S. aralensis* from *S. neglecta* is shape of outernmost apical caudal seta, which is curved in *S. aralensis* (figs. 44, 45). To clarify taxonomic state of *S. aralensis* detailed redescription of *S. neglecta* is necessary.

S. aralensis was originally described by Borutzky (1971) from the Aral Sea. As salinity of the lake increased significantly from 12 ppt in 1970 to 70 ppt in 2002, *S. aralensis* (and other congeners) was not recorded in the Uzbekistan part of the Aral Sea for at least the last 15 years (Mirabdullayev et al., 2004).

Conclusion

The genus *Schizopera* is represented in Uzbekistan by 5 species: *S. jugurtha* (Blanchard et Richard, 1891), *S. reducta* Borutsky, 1971, *S. aralensis* Borutsky, 1971, *Schizopera spinulosa* sp. n. and *Schizopera setulosa* sp. n., from which only three last species were recorded in this study.

This study was supported by DFG grant. We thank prof. K. Schminke (Oldenburg, Germany) for help in conducting the study and Dr. J. W. Reid (Martinsville, USA) for helpful suggestions.

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